Inventory Preparation for Modeling

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Objectives of Presentation

- Provide general overview of preparing inventory for AQ modeling

Try to be Model Neutral -- Grid Models and Gaussian Models
And Pollutant Neutral -- Toxics and Criteria Pollutants

- Present specific checks needed when conducting local scale analyses

Specifics geared towards -- Gaussian Models used for air toxics risk assessments

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Challenges in Preparing an Inventory For Modeling

- Different air quality models have different emission needs
- Inventory information doesn't match those needs
- Inventory information evolves -- emission processors must keep up with the changes
- Terminology can be different from inventory to processor to air quality model

Inventory preparers should understand the inventory and its development and the AQ model

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Air Quality Models Want ...

- Hourly time resolution
- Geographically resolved emissions (gridded or specific dimensions)
- Pollutant species ("model species") to meet needs of AQ model chemical/physical algorithms
- *Risk assessors want pollutant species to match health effects data
- All sources represented
  - Anthropogenic, Biogenic (grid models)
- Domain wide coverage

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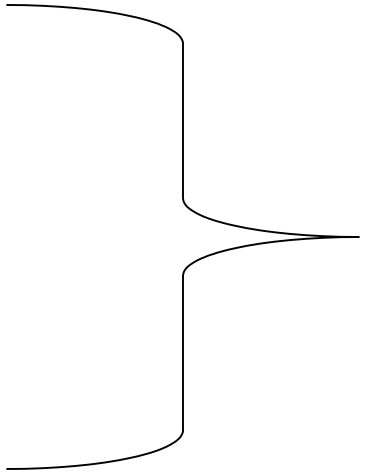
Developing of Emissions Inventories for Modeling Requires

- Quality Assurance/Quality Control
- Temporal Allocation
- Spatial Allocation
- Pollutant Speciation
- Emission Projections



Typically done in an Emission Processor

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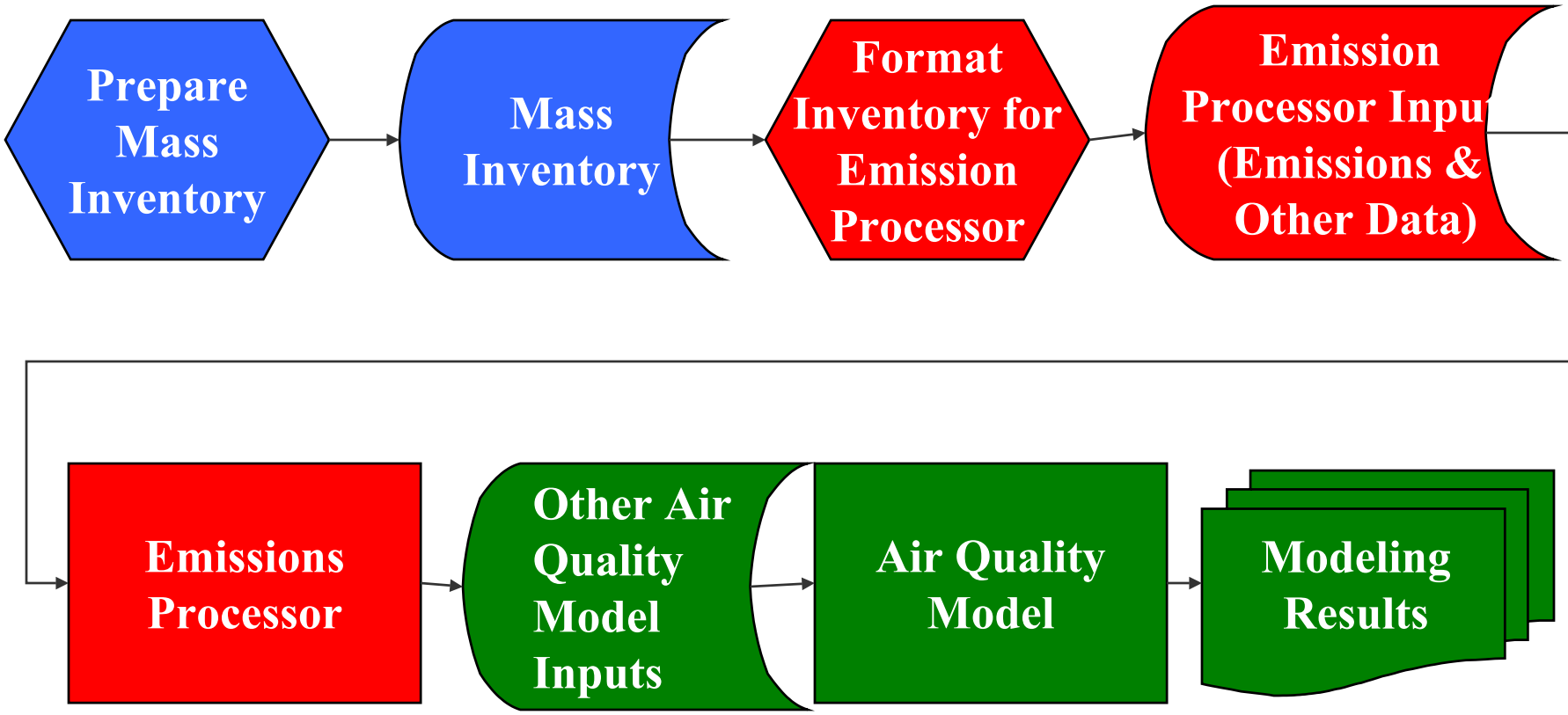
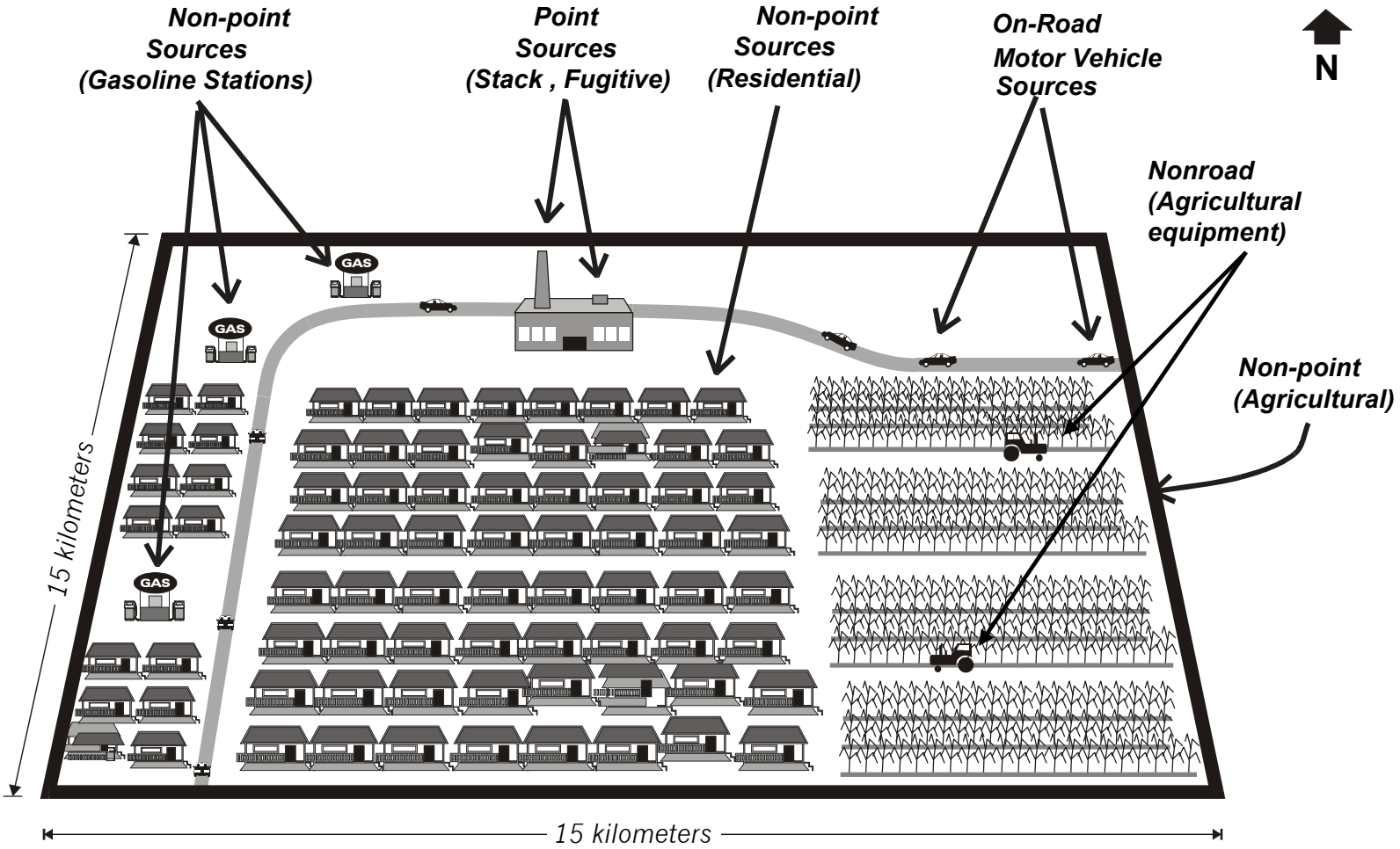
The Big Picture



Example Modeling Domain



Point Sources

- Inventory Perspective: Emissions occur at a facility – at a known location
- AQ Model Perspective: Point sources are vertical stacks
- Key inventory elements
  - Facility/Process/Stack-Level emissions, by pollutant
  - Geographic coordinates
  - Emission release point parameters
  - Operating schedule
  - Control Information (for projections)

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Non-Point or Stationary Area Sources

- Inventory-perspective: county-level emissions
- AQ model perspective: non-stack
- Key inventory elements
  - Category-Level Emissions (process/industrial category), by pollutant
  - State/county
  - Operating Schedule
  - Control information (projections)
- Non-point and Nonroad emissions treated similarly by emission processor and AQ model

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Steps to Prepare Inventory for Emissions Processor

National Emission Inventory (NEI) is starting point

- Develop “modeling files” containing the necessary variables for processing and QA
- Subset to modeling domain
- For all inventory categories: check inventory codes (SCC, SIC, MACT), pollutants, FIPs codes, and make sure all necessary cross references are available for emission processor ancillary files

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Steps to Prepare Inventory for Emissions Processor, continued

- Analyze point sources: locations, stack parameters
- Analyze non-point, nonroad sources: categories with distinct locations
- Analyze pollutant species, top emitters
- Gather additional source-specific information to improve upon locations, stack parameters, specificity of pollutant species
- Check to see if operating information / other inventory periodicity information can provide source-specific temporal profiles

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Point Source Inventory Analysis

- Geographic coordinates
  - Check if any were defaulted – find actual values
  - Check that coordinates are consistent with county and that multiple release points within same facility are nearby
  - Analyze highest emitters (for each pollutant)
- Stack parameters
  - Check if any were defaulted – find actual values
  - Check similar parameters for similar SCC/SIC
  - Analyze highest emitters (for each pollutant)
- Add modeling information likely not in inventory
  - Building parameters
  - Fugitive release parameters
  - Dimensions for sources with known locations

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Non-Point Source/Nonroad Inventory Analysis

- Look at source categories to determine if they can be allocated to actual locations, e.g., landfills
- Find locations, area source dimensions, release parameters - placing emissions in the proper location will always improve the modeled estimate
- Develop surrogates for those categories than cannot be allocated to actual locations

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Conclusions

- Inventories used for modeling are more than just emissions – AQ models need more detailed inputs
- Take steps to insure the inventory can support temporal, spatial and speciation needs as required by the analysis
- Inventory preparers work with modelers to understand what they need and ensure they know the limitations of the inventory

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Conclusions

- Junk In = Junk Out" – results only as good as inputs
  - Recommend that additional and redundant QA/QC be performed on the inventory
- www.epa.gov/ttn/chief/emch is a resource

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